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Differentiation of Social and Economic Situation in the Russian Regions and Problems of Regional Policy

Nadezhda Mikheeva

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CONTENTS

NON-TECHNICAL SUMMARY

Under conditions of reform, the socio-economic situation of separate regions has appeared to fall under the influence of a set of new factors. These include: the rate and scale of economic transformations; the development of market sectors; opportunities to use the potential of natural resources and geographical position; foreign economic co-operation (a particularly important factor); the mutual relationship of each separate region with the Central Government; and the ability of the regional elite to adapt to new conditions and to make good use of them. All these factors have promoted the growth of regional differentiation. The amplification of inter-regional differentiation leads to a number of negative social and economic consequences. The researchers therefore aim to analyse the processes occurring in the given sphere, under the conditions of a transition economy, by estimating quantitatively the basic parameters of the process of inter-regional stratification and also by determining the major factors forming its dynamics.

The traditional sphere of research into inter-regional and inter-country differences is formed by the dynamics of average per capita production. This parameter is basic in the research. Another, describing the results of economic activity, is average per capita personal incomes. Both are closely connected to each other and have basically identical dynamics. However, analysis shows that, for the Russian economy, with a significant share in the shadow sector and dubious statistics, these parameters are weakly correlated, i.e. regions with a higher level of incomes do not necessarily have a higher level of per capita production. We have carried out an estimation of the process of differentiation using two parameters: the formation of incomes by average per capita personal income; and for production by per capita gross regional product (GRP).

The official statistics of Goskomstat were the basis of the statistical data for the research, although they appeared to be insufficient. Goskomstat has been carrying out estimations of gross regional product in the subjects of the Russian Federation in current prices since 1994. Considering that data in constant prices is required for inter-regional comparisons, we made an expert estimation of the GRP parameters for 1990-1996 by means of a technique used by the World Bank for the NIS countries. The estimation of real personal incomes was carried out on the basis of official data on the money incomes of the population and consumer price indices.

The estimated variation in the average per capita regional indicators has confirmed the initial hypothesis as to the existence of a process of inter-regional differentiation. The variance in average per capita incomes in 1996, in comparison with 1990, increased by a factor of more than 1.8. The variance in

average per capita GRP was, in 1990, much more than that for the corresponding parameter for incomes, (0.499 and 0.207 respectively); however, it has increased over the 6 years by a factor of only 1.12.

Analysis of the dynamics of inter-regional differentiation assumes that the tendencies in the development of the process will be revealed. These can be characterised either by the convergence or the divergence of the corresponding parameters. Our estimations have shown that the dynamics of production and average per capita incomes in the Russian regions in the reform period was characterised by divergence, while the speed of this process for real incomes appears higher than for average per capita GRP.

An increase in the parameters of inter-regional differentiation means that the gap between poor and rich regions is growing. Depending on the change in the correlation between regional and average Russian parameters, it is possible to single out two groups of regions: rich and growing rich ones (with the indicators exceeding the average Russian level during the whole period, or exceeding the average level during the reforms) and poor and growing poor ones (with the indicators being lower than the average Russian level during the whole period, or the region itself having moved from the group with high indicators to the group with below average indicators). Allowing for the general amplification of differentiation, the distinctions between the groups are increased, although inside them a relative convergence in the parameters is observed.

The classical means for a quantitative estimation of the factors which determine distinctions in regional dynamics are the growth models. The most widespread are the Solow models based on human capital and a number of additional factors. Models of this type were used in the widely-known papers by Barro and Sala-i-Martin dealing with growth theory, as well as elsewhere. This methodology was applied to research into the dynamics of differentiation in many countries, with both positive and negative production dynamics. Therefore, at the initial stages of this research, the researchers were able to consider the growth models which were acceptable in an analysis of the dynamics of a transition economy.

In the literature devoted to the problems of transformational recession, the use of growth models is considered to be rather problematic, as the transformational recession in production in Russia is caused by the structural deformations which developed in the regions before the reforms. An attempt to estimate the parameters of an extended Solow model, on the basis of the data on 76 Russian regions for 1990-1996, has shown that it is not possible to obtain statistically significant results. The variables describing human capital are not included in a number of statistically significant parameters. The

estimates have confirmed the assumptions that growth models do not explain transition dynamics.

In this connection, a quantitative estimation of the influence of various factors on the development of the process of inter-regional differentiation was carried out on the basis of regression analysis. The researchers use as explanatory variables the deviations from the average regional indicators of per capita GRP and average regional per capita real personal incomes. The set of the factors used as regressors reflects the objective conditions which were formed in the region prior to the reform (average per capita production or per capita real incomes, and a form of development that was mainly either industrial or agrarian, as measured by the share of the sector in GRP), and also the results of the economic transformations occuring in the process of the reforms (the development of foreign trade, as measured by average per capita exports, the development of the service sector, average per capita investment, rates of inflation, per capita incomes and the expenditures of the regional budgets). We assumed that the second group of factors characterises the results of the regional policy pursued.

The data file that was compiled included statistics on 76 Russian regions for 1990-1996, which were considered as panel data. This analysis of panel data has allowed us to take into account the influence of temporal and spatial changes in the regressors on inter-regional differentiation. The general size of the variance is formed mainly by the amplification of spatial distinctions (i.e. between groups). The influence of temporal (intra group) changes in the regional parameters is less essential.

The research confirms the hypothesis concerning the dependence of the rates of recession in the regional parameters on their initial level — the reduction in the per capita parameters was strongest in the regions that were under-developed before the reform. The development of the service sector is one of the factors characterising the changes in the regional structure of production and one which exercises the most essential influence on the dynamics of inter-regional deviations.

The estimation of the factors determined by regional policy (the per capita revenues of the regional budgets), has shown their stabilising influence on regional differentiation. However, the elasticity of the factors related to the results of reform is insignificant. This fact proves that there are rather limited opportunities for influencing the resulting parameters of differentiation through short-term and medium-term regional policy over the rather brief time interval under consideration. Nevertheless, the difficulty in smoothing out the inter-regional distinctions could probably be resolved in the long-term on the basis of long-term regional policy and, in particular, structural and investment measures.

INTRODUCTION

The beginning of market reforms in the Russian economy has resulted in a sharp differentiation in the socio-economic situation of regions, observable practically in all statistical parameters. For Russia, a country with a huge territory and objectively strongly-differentiated conditions of life amongst the population and of production in the various regions, the problem of regional distinctions is not new; the inter-regional alignment of the standards of living of the population was traditionally considered as one of the purposes of the planned formation of territorial proportions. Under conditions of reform, the socio-economic situation of separate regions had appeared to be under the influence of a set of new factors. To their number belong the rate and scale of economic transformations; the development of market sectors; opportunities for use of natural resources and geographical position, and the factor of foreign economic co-operation in particular; the mutual relationship of each separate region with Central Government; and the ability of the regional elite to adapt itself to new conditions and to put them to good use.

The problem of regional inequality is not something special, typical only of the Russian reform, it is urgent for all countries with a federal system of government or an extensive territory, by virtue of which the differentiation in the economic position of the population in different regions leads to a strengthening of socio-economic intensity, and serves as a ground for inter-regional conflicts. The maintenance of regional parity by means of various methods of state regional policy, and the maintenance of national social standards in particular, is an essential item of the governmental charges in many countries and consequently the processes of divergence or convergence in regional development serve as the object of the steadfast attention of researchers and politicians in many countries.

For the transitional Russian economy, the problem of regional differentiation, besides the purely economic aspects, frequently gets a political colouring, since it provides an economic base for the development of regional separatism. Occurring at the beginnings of reform, the polarisation of the regions to a small number of "rich" regions with a high level of income and economic activity, and the basic bulk of "poor" and "becoming poor" regions, which will, most probably, deepen. A strengthening of the differentiation in the socio-economic situation in the regions will subsequently lead to aggravating the social contradictions between rich and poor regions and require active governmental intervention in their regulation – in particular, the implementation of governmental regional policy, aimed at overcoming the sharp distinctions in the socio-economic situation of the regions.

The problems of regional differentiation and regional inequality has been a subject of active foreign research since the end of the 1950s. At the centre of attention of researchers are: the dynamics of the processes of spatial stratification; the factors which determine the processes of regional divergence or convergence; an estimation of the impact of market forces and the

regulating influence of the government on regional differentiation [Williamson, 1965; Alonso, 1980; Barro and Sala-i-Martin, 1995; Lee, 1996; Rodwin and Sazanami, 1988, 1991].

Theoretically, research into the dynamics of inter-country or inter-regional distinctions are based mainly on the growth models, including the consideration of human capital, and also a number of other factors determining the regional dynamics. To their number, besides the characteristics of physical and human capital, belong: the structure of production in regions; migration of the population; investments, including state, private and foreign; distinctions between state expenses in the regions; factors connected with market conditions (influence of the shadow economy, terms of trade, etc.); and factors determining political stability in the country or region (change of political regimes, regulation, property rights, etc.) [inter alia, Barro and Sala-i-Martin, 1995; Lee, 1996; Chen and Fleisher, 1996].

The overwhelming majority of research on regional inequalities is carried out for countries with a market economy. Research on the problems of regional inequality for countries with a transition economy has recently started to occur; first of all, research into inter-provincial inequality in the economy of China [Tsui, 1996; Chen, 1996; Wei and Ma, 1996].

Literature on the problems of regional differentiation in the Russian economy is not extensive. Recently, after the publication by Goskomstat of the Russian Federation of a number of collections containing data concerning the parameters of the economic situation in the territories, there appeared a series of papers devoted to the problems of differentiation of the levels of economic development of Russian regions [Трейвиш, Нефедова, 1994; Чистяков, Теплухина, 1996; Новикова, Рябцев, Тихомиров, 1995; Анализ..., 1996a; Анализ..., 1996b]. The basic results of research on the Russian economy consist of the fact that reform has resulted in a sharp stratification of the regions according to their socio-economic situation, the typology of the regions in connection with the acuteness of the crisis is given, with the distinction of rather safe or unsuccessful regions [Маркова, 1996; Жандаров, Шиллер, Никитина, 1995; Анализ..., 1996b].

We set forward the purpose of considering the processes of the regional differentiation of the socio-economic situation of Russian regions under the conditions of a transition economy, by estimating quantitatively the basic parameters of the process of inter-regional stratification and also by determining the major factors which form its dynamics.

The research begins with a quantitative estimation of the inter-regional distinctions of the reform period. The traditional sphere of research into inter-regional and inter-country distinctions is the dynamics of the per capita parameters of production. Another parameter, describing the results of economic activity, is per capita personal income. Both parameters are closely connected with each other and have basically identical dynamics. However, the analysis shows that, for the Russian economy with a significant share of the shadow economy and dubious statistical data, these parameters are weakly

correlated, i.e. the regions with a higher level of personal income do not necessarily have a higher level of per capita production. We have carried out an estimation of the process of differentiation by two parameters: in the sphere of income formation – by per capita personal income – and in the sphere of production – by the parameters of per capita gross regional product (GRP).

An analysis of the dynamics of inter-regional differentiation presupposes revealing the tendencies in the development of the process that can be characterised by a rapprochement of the corresponding parameters (convergence) or their divergence. In this connection, we intended to verify hypotheses for the dynamics of production and per capita income of the population of the Russian regions in the reform period.

The development of the process of inter-regional differentiation is under the influence of a set of factors determining the course of the reforms in each of the regions. In this research, an attempt is made to estimate the influence of objective factors, such as the economic potential of the region, usual in the pre-reform period; the structure of production; the export orientation of its development; and also the results of the economic policy pursued during the reform (inflation rates, budget security of the region, etc.).

1. MEASUREMENT OF INTER-REGIONAL DIFFERENTIATION

The most widespread method of the measurement of the size of regional differentiation is the variance factor, describing the scope of the fluctuation in the regional values of the parameter in relation to an average value. As an estimation of the differentiation of income in the regions, the Gini coefficient is widely used. A class of indices of generalised entrophy is less popular, though it has a number of desirable properties: for example, unlike the Gini coefficient, it is sensitive to moving from the bottom part of the distribution to the top [K.y.-Tsui, 1996]. Close in character to entrophy factors is the Teil coefficient, also used for inter-regional comparisons [Das and Barua, 1996].

A comparison of the results of estimations on the basis of various measures [K.y.-Tsui, 1996] has shown that they equally catch the tendency of the process, and their distinctions concern different degrees, taking into account changes in distribution character. As we are interested more in the tendency of the process, instead of the particular values of its characteristics at each separate moment of time, for an estimation of the inter-regional differentiation of per capita indicators the variance in a simple parameter, measuring the dissemination of the regional parameters in relation to the average, was used:

$$\sigma_t = [(1/n) \Sigma_i [\log (y_{it}) - \mu_t]^2]^{1/2} \qquad (1)$$

where y_{it} – per capita personal income in region i in year t, and μ_t – average meaning of log (y_{it}).

Research into the dynamics of the per capita parameters traditionally assumes a check of the number of hypotheses, the most obvious among which are the following: 1) identification of the process of convergence or divergence; 2) the dependence between the rates of recession of a parameter and its initial level. For an examination of the inter-regional differentiation of Russian regions during the time of the reform, we used the classical approach to the analysis of convergence, based on traditional techniques [Barro and Sala-i-Martin, 1991, 1992, 1995; Sala-i-Martin, 1996a, 1996b].

Two parameters for the measurement of the process of convergence are offered by Sala-i-Martin: absolute (β) and conditional (σ) convergence. For measurement of the speed of convergence (or divergence) the parameter of absolute convergence (β) is used, which is defined as follows. Let $y_{i,t}$ be the per capita gross national product (GNP) of the economy i at year t, $\gamma_{i,t,t+T} = \log (y_{i,t+T} / y_{i,t})/T$ – the annual rate of growth in per capita GNP for the period from year t up to T. If, following an estimation of the following regression:

$$\gamma_{i,t,t+T} = \alpha - \beta \log (y_{i,t}) + \varepsilon_{i,t} \qquad (2)$$

it appears that $\beta>0$, it will correspond to the presence of β-convergence, according to which a poor economy tends to grow by faster rates than a rich one; the higher is this value, then the faster the poor economy comes nearer to the rich level. And, on the contrary, $\beta<0$ corresponds to the process of divergence, when the gap between poor and rich is increased.

According to the concept of σ-convergence, the process of convergence for a group of economies takes place if a deviation in the per capita parameters tends to a reduction, i.e. $\sigma_{t+T}<\sigma_t$, where σ_t – standard deviation. Both definitions of convergence are connected and, moreover, it is shown that a necessary condition for the existence of σ-convergence is the presence of β-convergence [Sala-i-Martin, 1996].

The classical approach for a quantitative estimation of the factors determining the distinctions of regional dynamics are the growth models. The most widespread are Solow's models, which include human capital in the analysis, and also a number of additional factors. On the basis of the growth models, the well-known papers of Barro and Sala-i-Martin [Barro and Sala-i-Martin, 1995], and also a set of other research studies, can be constructed [Sala-i-Martin, 1996b; Lee, 1996; Chen and Fleisher, 1996].

This methodology was used for research into the dynamics of differentiation in several countries, both with positive and negative dynamics of production; therefore, we consider it necessary to dwell on the peculiarities of the given methodology in more detail. At its base lays an extended neo-classical Solow model with human capital, which includes in the analysis inter-country

distinctions in the conditions which were existing at the beginning of the considered period, the peculiarities of production structure, and also a number of control and exogenous variables. Differences between the models of such a type and classical production functions consist in the fact that, instead of the parameters of labour and capital in the model, the characteristics of the initial conditions of the development of the economy and its human capital, and their interaction, as well as additional variables, appear.

Average annual growth rates can be submitted as the functions from variables of two types: regional variables, which create distinctions between the initial conditions in the regions; and control and exogenous variables, which define rates of regional per capita production during the examined period at the given values of the regional variable. This is defined as follows [Barro and Sala-i-Martin, 1995]:

$$Dy_t = F(y_{t-1}, h_{t-1}; \ldots) \qquad (3)$$

where y_{t-1} is initial per capita GRP, h_{t-1} is the initial human capital per person, and the omitted variables comprise control and exogenous variables.

In empirical research, the initial level of GRP is introduced in the regression for growth rates in a logarithmic form: $\log(y_{t-1})$. Therefore, the coefficient of this variable represents the rate of convergence (or divergence); that is, the responsiveness of the growth rate Dy_t, to a proportionate change in y_{t-1}. Human capital is included in the model as various statistical parameters. As control and exogenous variables, Barro and Sala-i-Martin considered the following: public expenditure on education in ratio to GDP; the ratio of real gross domestic investment to real GDP; the ratio of government consumption, measured as spending on defence and education, to GDP; the shadow market premium on foreign exchange; political instability (a linear combination of revolutions and per capita political assassinations per year); and the growth rate in the terms of trade.

The reform period in the development of the Russian economy is characterised by a transformation recession in production, caused by structural deformations which developed in the regions even before the reform. In the literature devoted to the problems of a transformation recession, the use of growth models is considered rather problematic. Nevertheless, we undertook an attempt to estimate the parameters of an extended Solow model on the basis of data on 76 Russian regions, which has appeared to be unsuccessful (see 3.3). Using different calculation variants, it was not possible to develop estimates of models that were statistically significant, as variables for human capital and one for interactions are not included in the number of significant parameters.

In this connection, the quantitative estimation of the factors determining the process of inter-regional differentiation was carried out on the basis of a

regression model. The set of factors included two groups of variables: those describing initial conditions in the regions; and those connected with reforms conducted in the regions.

At the formation of the initial research hypotheses, we used the following facts as a basis. Amplification of inter-regional differentiation is caused by various rates of the curtailment of production in the regions, which are defined by the initial conditions existing in the regions and also the changes occuring during the reforms. The set of factors considered in the literature as reasons for the amplification or reduction of inter-regional distinctions is extremely extensive and includes, as we mentioned above, factors of an economic, social and political character. The opportunities of a choice of the factors included in our research have appeared rather limited by an accessible statistical database. Regional data in Russia is much poorer than national data; therefore, the amount of statistical parameters included in the consideration, and their setting, was largely determined, besides pithy research hypotheses, by the presence of the data.

To the number of variables for the initial conditions pertain: per capita GRP and also the peculiarities of the structure of a regional economy; the either mainly industrial or agrarian orientation in the development of the region; regional infrastructure, which was characterised by the development of transport; and construction. For an estimation of the structural factors, we used the shares of the corresponding sectors in GRP.

In the pre-reform period in the Russian regions, as well as in Russia as a whole, an inefficient structure of production was formed in which, because of the prevalence of elementary and military sectors of production, the service sector was extremely poorly developed. The results of the reforms in separate regions depend on the occurring structural shifts, primarily the growth in the share of sectors connected to the export of raw materials, but also the development of the service sector which, under conditions of reform, has appeared a factor stabilising the recession in production. Therefore, to the number of variables describing changes in the regions during reform are referred structural shifts connected to the development of the service sector, and changes in the share of the sectors providing market and non-market services.

Moreover, in addition to a number of the factors determining the results of the reforms in the region, a number of variables was included which differ in the regions and, according to our assumptions, in their rendered influence on the dynamics of production. As one of the major factors determining the rates of production of the Russian regions, export orientation is considered. A high share of exports means a stable market for regional products; besides, exports are a source of real money, therefore this factor was included in the regression.

The result of macroeconomic policy is the dynamics of the price indices. The inter-regional distinctions in the dynamics of prices are a consequence of the set of factors in the development of the regions, connected to the structure of production in the regions, income level, etc. From the point of view of the long-term research of growth, inter-regional price differences can be considered as a result of development. But, since we are carrying out an analysis for a medium-term interval of time, it is possible to consider the change in prices as an exogenous factor, which defined the dynamics of real incomes directly and the dynamics of production indirectly. The regions which led prices at the initial stage of the reform had the opportunity for the reception of inflationary incomes but, subsequently, high prices with a limited demand became the factor stimulating the further curtailment of production.

The influence of the government on the dynamics of differentiation is rendered through a set of parameters reflecting governmental regional policy. To their number pertain all kinds of state expenditures carried out in the region by various channels. Here belong social transfers to the population of the region, interbudget transfers, investment from the federal and local budgets, and regional support funds. But regional data for the measurement of this factor are rather limited; therefore we used accessible parameters, reflecting the economic policy pursued in relation to the region. The most suitable in this connection are the per capita incomes and expenditures of the regional budgets, which reflect the income base of the region, inter-budget transfers and the level of expenditures in the region.

In general form, the model is written down as follows:

$$Y_{rt} = a_0 + \sum_{n=0,\ldots,N} a_{nrt} X_{nrt} + c_{rt} Z_{rt} + \varepsilon_{rt} \qquad (4)$$

where: r – region, t – year, n – number of explanatory variables, Y_{rt} – deviation of a regional parameter from the average, X_{nrt} – explanatory variables, Z_{rt} – indicator of the specific peculiarities of the region (dummy variables), and ε_{rt} – residuals.

The file $\{Y_{rt}, X_{nrt}\}$ is considered as panel data, which enables us to estimate the influence on a resulting parameter of temporal and spatial changes in the explanatory variables. The resulting parameters of inter-regional distinctions were measured as $Y_{rt} = \log (Y'_{rt} / Y'_t)$, where Y'_{rt} – the value of a regional parameter, and Y'_t – the corresponding average Russian parameter. The variables of unidentified regional features (the regional dummy) in our calculations were determined through the subject of the Federation belonging to one or another economic district; thus they reflect the geographical situation of the regions and those from their features which are common for the whole district.

2. DATA

As regional statistical units, Goskomstat of RF uses as regions the subjects of the Russian Federation. The administrative division of Russia took place under the influence of a set of factors and conditions which were not oriented, as a rule, towards the allocation of similar units from the point of view of economic potential, therefore the territorial-administrative units differ widely in territory, population and economic potential. The large territorial formations – the economic regions – are more similar economically, and the parameters of their development are more steady; however, they are not objects of state management, and the amount of published statistical data for them is even smaller than for the subjects of the Federation. The estimation of the parameters of regional differentiation was made in a number of cases for these and for other units but, as the basic territorial unit in the given investigation, the administrative units of the Russian Federation are used.

The research into the processes of the inter-regional differentiation of the Russian regions in the reform period was envisaged in two spheres: production; and the formation of personal incomes. For an estimation of the processes of inter-regional differentiation, two statistical parameters are usually used: per capita personal real incomes – for the analysis of differentiation in the sphere of incomes; and per capita gross regional product – for the analysis of differentiation in production. Therefore, we formed two files: GRP and real incomes in the regions (i.e. the subjects of the Russian Federation).

2.1. Estimation of gross regional product

In the pre-reform period, statistics for the macroeconomic parameters of regional development were published incidentally. In open papers, data on the volume of national income in the regions were published only for 1992, and calculated by a methodology related to the balance of the national economy, which is not comparable with the methodological practice accepted elsewhere in the world based on the system of national accounts. Statistics for gross regional product in the Russian regions, calculated using the methodology of the 1993 national accounts, are published only for 1994-1995 in current prices.

In the Russian statistics, calculation of gross domestic product in constant prices is still not made even at a national level, although there is a number of techniques which allow us to make an estimation of the parameters in constant prices. The technique of estimating the parameters of GNP in constant prices was offered by Goskomstat [Методологические..., 1996], an approach similar to that used by the World Bank in examining the results of GNP calculations in separate countries and one also applied in a number of research works in estimating the dynamics of macroeconomic parameters [Kuboniwa, 1996].

Therefore, for an estimation of differentiation in the sphere of production, the volume of the gross regional product in constant prices was estimated by us on the basis of officially published data on the dynamics of separate parameters for items using the known approaches.

The essence of the approach consists of the following. If we assume that independently-appreciated indices of the dynamics of the production of some sectors $g_i(t)$ are available, on this basis a cumulative index describing the dynamics of GRP can be estimated.

Let us assume that $Y_i(t)$ – the gross regional product (or national income), made in sector i in year t; and $g_i(t)$ – the rate of growth of output in sector i, appreciated on the basis of the appropriate physical index. Then:

$$Y_i(t+1) = (g_i(t)+1)Y_i(t),\ t=0,\ldots,T \qquad (5)$$

The gross regional product in year t is determined as Y(t): $Y(t) = \Sigma Y_i(t)$; accordingly, the rate of growth in the total index is:

$$G(t) = \Sigma(Y_i(t)-Y_i(t-1))/\Sigma Y_i(t),\ t=1,\ldots,T. \qquad (6)$$

The dynamics of gross regional product were determined on the basis of the following factors, reflecting the dynamics of the physical volumes of output in the examined spheres:

industry – the indices of the physical volume of production in certain sectors;

agriculture – the rates of output of agricultural products in constant prices;

construction – the dynamics of construction starts, in square metres;

transport and communication – the dynamics of the volumes of cargo turnover;

distribution – the dynamics of retail turnover in comparable prices;

services – the dynamics of the number of those engaged in this sphere.

Other branches of material production were not taken into account.

Regional data for the accounts of production (sectoral accounts) are available for 1994; therefore this year was chosen as a basis, calculations for which were made by the indices of natural parameters from 1990 to 1994 and from 1994 to 1996. The resulting estimations reflect the dynamics of GRP in 1994 prices. The results of these estimations are given in Table A1 of the Appendix.

2.2. Estimation of real personal incomes

A source of data for the analysis of the inter-regional differentiation of the incomes of the population were the official data of the Goskomstat RF, published in various statistical editions. Goskomstat publishes statistical data on 80 subjects of the Federation. However, in these statistics information was missing for some regions; therefore the sample according to which estimations were carried out was based on data on 72 regions, all subjects of the Russian

Federation. Information on other regions, on which data in separate years were not published, were not examined. Among them there were some subjects of the Federation belonging to the North Caucasus region, on which data in separate years were not published (Chechnya, Adygeya), and also on regions which received the status of subject of the Federation only in 1992 (Republic of Altay, Evreiskaya Avtonmnaya Oblast, Chukotskii Avtonomnyi Okrug). The share of these regions in the formation of national parameters is insignificant; therefore, we consider that their exception will not render an essential influence on the results of the estimations.

For a realisation of inter-regional comparisons, data in comparable prices are necessary. Goskomstat publishes data only on money personal incomes; therefore we brought them into a comparable form on the basis of the available information on price indices. Data for money personal incomes on regions which were subjects of the Federation are published for 1970, 1980, 1985, and 1990-1996 [Российский..., 1996; Регионы..., 1997]. Data on the indices of consumer prices in the regions have been published since 1990 [data for 1990-1992 - Индексы цен..., 1994; 1993-1995 - Российский...,1996; Регионы...,1997], therefore the real incomes of the population have been appreciated by us only for 1990-1996 on the basis of the information on per capita money incomes and the indices of consumer prices in the regions of Russia.

Goskomstat practises the revision of previously-published parameters, including price indices. So, the indices of consumer prices in Russia for 1990-1992 which were published in 1994 were later revised upwards, although the results of such revision were not published for these regions. As the difference between the information on prices was essential, the indices of consumer prices in the regions for 1990-1992 were recalculated by us proportionate to their increase in Russia. As a result of these recalculations, real personal incomes in 1990-1996 in the regions are established on a basis comparable to 1990.

2.3. Data for the estimation of the factors

The resulting parameters are estimated in regression equations by the method specified above for per capita parameters of gross regional product in real terms and per capita real personal incomes.

The structural parameters included the share of industry, agriculture, construction, transport, trade and the services sector in the gross regional product in real terms in separate years in the considered period, producing an estimation of GRP.

The export orientation of a region was estimated by the per capita volume of its exports of production, for which the volume of exports in roubles in current prices is deflated by the industrial price indices, as the basic part of exports is made exactly by the production of an industry.

For the account of the inter-regional differentiation of prices, two parameters were included: the annual index of consumer prices; and the index of industry prices.

The parameter of regional investment was determined as the per capita investments carried out in the region from all sources of financing, deflated by the industrial price index, although it is hardly possible to consider the choice of deflator as successful, since data on the value indices of construction works in the regions are not present.

Owing to such specific peculiarities, which were taken into account through dummy variables, we examined the geographical position of a region, which was reflected in its belonging to one or another economic region or zone. For the setting of the regional variables, a standard grid of economic regions (11 regions) was used.

3. INTER-REGIONAL DIFFERENTIATION IN PRODUCTION

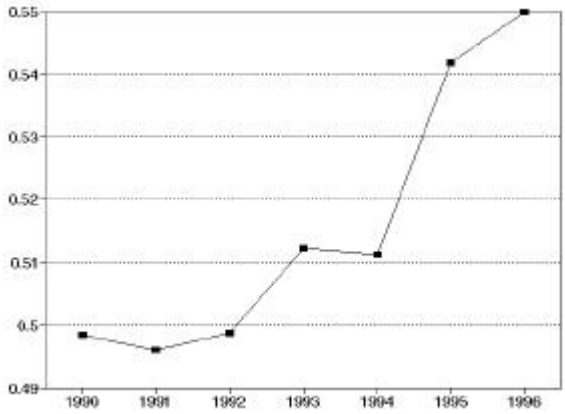
3.1. Parameters of GRP in the Russian regions

According to our estimations, the gross regional product of the Russian Federation in 1996 was 52.1% of the level of 1990 (with an annual reduction of 10.3%). The production of gross regional product in 1996, in comparison with the 1990 level, has decreased to 69.5% in Moscow (minimal recession) and to 24% in the Magadan area (severe recession). The reduction in the per capita volume of GRP was smaller: per capita production was reduced to a greater degree in the republics of the North Caucasus region (to 27.7% in Dagestan and 31.1% in Osetiya in 1996 compared to 1990) while smaller reductions were in Moscow (71.2%), and the Vologda area (68%). The range of the fluctuations has increased from 5.15 times in 1990 (the Tyumen area to the level of Adygeya) up to 10.9 times in 1996 (Tyumen area to the level of Kalmykia).

The standard deviation of the logarithms of per capita production, which shows the dispersion of the regional parameters in relation to the average, was 0.499 in 1990 and 0.550 in 1996, but the character of the distribution has changed. In it, the concentration of the regions, in relation to the 1996 average, has increased, while for the basic part of the observed regions the GRP values appear rather closer to the average. The amount of regions in the range with minimum and maximum values in 1996, in comparison with 1990, is lower. Thus, an increase in differentiation has taken place, accounting for the divergence from the bulk of the regions of a few poorer and richer ones.

In 1990-1992, the variance in the per capita parameters was almost unchanged. Since 1993, a rapid growth has been observed, which has occurred mostly without sharp leaps, although it was rather intensive during the whole of the examined period (Figure 1).

Figure 1. Standard deviation of the logarithms of per capita GRP in regions



When estimating the dependence of the rates of the reduction in gross regional product on the initial level of the corresponding parameters in 1990, a weak positive correlation can be observed, i.e. the higher the initial GRP level in the regions, the smaller the recession in production, which confirms the divergence of the inter-regional parameters, the correlation factor being 0.228.

In the estimation of the β convergence factor, on the basis of equation (2) for the parameters of per capita GRP between 1990-1996, statistically significant parameters for the regression equation were recorded. Parameter $\beta = -0.020$, the negative mark testifying to the presence of a process of divergence, which was revealed also by an estimation for the parameter σ, the speed of the divergence of regional parameters being low.

The increase in the parameters of the inter-regional differentiation for the reform period means that the gap between rich and poor regions has increased (rich ones have become richer, poor ones have become poorer). In this connection, the grouping of regions, formed according to the relationship of per capita GRP to the average Russian level, is of interest. Such a grouping characterises the results of the reform and allows the singling out of regions in which the given ratio during the reform was either improved or aggravated.

According to per capita production in gross regional product in 1990, all the considered regions were divided into 2 groups: 1 – regions with an above-average level of production; and 2 – regions with a below-average level of per capita production (Table 1). By 1996, each of the groups was split in two: 1.1 – regions from the first group, in which per capita production in 1996 exceeded

the average Russian level in the beginning and at the end of the considered period ("rich" regions); 1.2 – regions from the first group which, in the reform period, have lost the leading position, per capita production in them at the end of the period appearing below the average Russian level ("becoming poorer" regions); 2.1 – regions from the second group, in which per capita production during the reform period exceeded the average Russian level ("becoming rich" regions); and 2.2 – regions from the second group, production in which continued to remain below the average Russian level ("poor" regions).

Table 1. Structure of groups of regions by dynamics of per capita GRP

Group 1.1	Group 1.2	Group 2.1	Group 2.2.
Komi, Sakha, Murmansk, Moscow, Tyumen, Kamchatka, Magadan, Krasnoyarsk, Samara, Vologda, Sakhalin, Khakassiya, Irkutsk, Kemerovo, Lipetsk, Amur, Kareliya, Perm, Tomsk, Sverdlovsk, Yaroslavl, Arkhangelsk, Chelyabinsk	Primorye, St. Petersburg Khabarovsk Volgograd, Nizhniy Novgorod, Novosibirsk		Orenburg, Tatarstan, Bashkotarstan, Buryatiya, Omsk, Chita, Belgorod, Udmurtiya, Leningrad province, Kursk, Ulyanovsk, Kirov, Moscow province, Smolensk, Stavropol, Tula, Tver, Ryazan, Saratov, Novgorod, Kaluga, Kostroma, Oryol, Krasnodar, Altay kray, Chuvashiya, Kaliningrad, Vladimir, Voronezh, Rostov, Republic of Altay, Kurgan, Tambov, Pskov, Bryansk, Ivanovo, Marii El, Mordoviya, Astrakhan, Cherkesskaya, Penza, Tyva, Osetiya, Adygeya, Kalmykia, Kabardinskaya, Dagestan

In 1990, out of the 76 considered regions, per capita production of GRP exceeded the average Russian level in 29. The group of high-income regions was formed mainly by the northern and eastern regions and those with powerful industrial potential, such as the Sverdlovskaya area and Samara areas and a number of others.

During the reform period, this distribution has changed: 6 regions from the first group have moved into the second, i.e. the relative level of per capita production in them has decreased. Among them, except for two far-eastern regions (the Khabarovsk and the Primorye Territories), have appeared the St. Petersburg, Volgograd, Nizhniy Novgorod and Novosibirsk areas. They are regions with powerful industrial potential and, specifically, a significant share of the defence sector. The reduction in per capita GRP production in them was

caused by a significant recession in industrial production, first of all at the expense of the defence sector.

Group 2.1 is empty, i.e. none of the regions with a level of per capita production lower than the Russian average has improved its situation. The group of regions with incomes below the average Russian level has been extended; to it have been added a number of regions dropping out of the first group.

It was specified above that the convergence factor for the whole sample is negative, i.e. the process of an inter-regional divergence in per capita GRP volumes has been observed. The estimation of factor β in equation (2) in the groups of regions for 1990-1996 is given in Table 2.

Despite the general divergence, for separate groups of regions where factor $\beta>0$, this corresponds to a process of rapprochement of the levels of per capita production inside the groups. Thus, the distinctions in the volumes of per capita production inside the group of the richest regions during the reform period have decreased.

Table 2. An estimation of factor β for per capita GRP in groups of regions

	All Regions	Group 1.1	Group 1.2	Group 2.2	Group 1.2 + 2.2
β (se)	-0.020 (0.010)	0.018 (0.023)	0.182 (0.069)	0.018 (0.024)	0.011 (0.183)
t statistic	-2.009	0.786	2.638	0.741	0.593
R^2	0.052	0.029	0.635	0.012	0.007
F statistic	4.038	0.621	6.963	0.549	0.351
Number of regions	76	23	6	47	53

This can also be said about the poor and becoming poor regions, distinctions among which have also decreased during the reform period. It also confirms the already-noted change in the character of the distribution, of a differentiation growing at the expense of an increase in the gap between the richest and poorest regions.

3.2. Factors in GRP differentiation

For a quantitative estimation of the factors determining the process of the inter-regional differentiation of the parameters of gross regional product, a simple regression model was used, represented by equation (4). The statistical estimations of the parameters of the model were made both without taking account of the spatial-temporal structure of the data (cross-sectional) and with taking account of it (panel data). We had different sets of statistical data for two time periods. For 1990-1996, there were available: an initial level of per

capita GRP production; structural variables; per capita exports; investments; and price indices. The data on regional budgets were available only for 1992-1995; therefore we estimated 2 models: GRP1 with the first data set; and GRP2 with a data set for 1992-1995 (accordingly for the parameters of real incomes RI1 and RI2).

The regression equations in both cases were estimated for 76 regions. The choice of a regression model on the basis of formal criteria has shown that, in the case of panel data, a model with fixed effects is more acceptable. The results of estimations of models with cross-sectional and panel data are given in Table 3.

Table 3. The parameters of the regression equation of GRP differentiation (model GRP1, 1990-1996)

	Cross-sectional Data			Panel Data		
	b	se	t	b	se	z
Constant	-7.947	0.207	-38.461	-1.076	0.060	-18.004
GRP 1990	0.860	0.028	32.105			
Agriculture	-0.067	0.014	-4.902	-0.344	0.023	-15.203
Service	-0.222	0.023	-9.884			
Investments	0.046	0.006	7.525			
Price indices in industry				0.035	0.004	9.324
dum Tsentralno-Chernozemnyi	-0.056	0.015	-3.646			
dum Povolzhskii	-0.054	0.018	-2.985			
dum North Caucasus	-0.173	0.020	-8.856			
dum Dalnevostochnyi	-0.052	0.025	-2.044			
R^2 (overall)				0.528		
R^2 (within)				0.364		
R^2 (between)				0.544		

If we use cross-sectional data, the following regressors have appeared statistically significant in the GRP1 model: the initial level of the development of the region (log GRP 1990); the share of agriculture and service sector in GRP; and, from the number of variables connected with the reform results, the per capita volume of the investments. These regressors have appeared to be statistically significant explanatory variables, specifying unidentified regional peculiarities (dummy variables) for 4 regions: the Central Chernozyomny raion, the Povolzhsky raion, the North Caucasus raion and the far-eastern raion. To the number of peculiarities of the first three regions, unconsidered in the model, there should possibly be included their geographical position in the

centre of the country and a higher density of economic activity in comparison with other regions. All regional factors have received negative estimates, which testifies to their stabilising influence on the size of the regional deviations.

The results of the estimations have confirmed the hypothesis of the essential influence of the pre-reform situation in the regions on the dynamics of the regional deviations. The variable of initial conditions has a positive mark and the highest elasticity (0.860), i.e. the higher the level of per capita GRP in the region before the reform, the more essential is its contribution to inter-regional differentiation. The service sector is marked by a rather high elasticity, which confirms the above-stated assumption of a stabilising role of services under conditions of reform as, with the significant curtailment of production in other sectors, the increase of the share of the service sector promotes a smoothing of the inter-regional distinctions.

In a regression equation with fixed effects, the influence of particular regional variables, as well as the influence of the initial conditions, has been eliminated. In accounting for the panel data from the results of regression, it follows that more than 50% of the inter-regional variance in per capita GRP can be explained by the influence of two major factors – the share of agriculture and the dynamics of industrial prices. Thus, the share of agriculture has received a negative mark, i.e. an increase in this factor results in a reduction in inter-regional differentiation. A positive connection is observed between GRP differentiation and the indices of industrial prices, in which the elasticity factor is 0.035, i.e. a 1% increase in the indices of industrial prices leads to an increase in the variance factor by 0.035%.

From the analysis of the panel data, it follows that the general size of the standard deviation (overall) is determined mainly by inter-group distinctions, i.e. an increased spatial dispersion of the parameters. Temporal (internal) deviations are less essential; the size of the inter-group dispersion is 0.544, while the intra-group dispersion is 0.364.

According to our hypotheses, the direct influence of regional policy on the dynamics is displayed through the factors connected to the size of average per capita incomes and the expenditure of the regional budgets. The influence of this factor on the resulting parameters was estimated for model GRP2 (Table 4).

In the transition to model GRP2 for a regression using cross-sectional data, the parameter of expenditure of the regional budget can be included in the number of significant elements, with a factor of 0.108. Less essential was the influence of the initial conditions of development, but the elasticity of the factor in the service sector has increased.

Table 4. The parameters of the regression equation of GRP differentiation (model GRP2, 1992-1995)

	Cross-sectional Data			Panel Data		
	b	se	t	b	se	z
Constant	-6.595	0.301	-21.908	-0.411	0.193	-2.123
GRP 1990	0.799	0.034	23.549			
Agriculture	-0.064	0.017	-3.713	-0.227	0.045	-4.994
Service	-0.328	0.032	-10.226	-0.251	0.039	-6.457
Investments	0.063	0.015	4.216	0.058	0.021	2.767
Budget expenditures	0.108	0.019	5.804	0.059	0.021	2.797
dum Tsentralno-Chernozemnyi	-0.052	0.020	-2.617			
dum Povolzhskii	-0.062	0.023	-2.738			
dum North Caucasus	-0.212	0.025	-8.355			
dum Dalnevostochnyi	-0.075	0.032	-2.239			
R^2 (overall)				0.644		
R^2 (within)				0.322		
R^2 (between)				0.665		

The more significant changes occur in the account provided by panel data: two structural variables – the share of agriculture and the share of the service sector – and the parameters connected to the regional policy (the budget expenditures and investments) have appeared to be structurally significant. And the structural variables have negative marks, i.e. they exert a stabilising influence on the size of the variance.

The estimation of the factor of expenditure from the regional budget has appeared statistically significant, with a regression factor of 0.059. The size of per capita expenditures from the budgets is strongly differentiated in the regions. In time, distinctions accrue: the variance factor of the parameter was 0.106 in 1992 and 0.194 in 1995. In the context of the given model it means that the higher the size of the per capita expenditure of the regional budgets, the greater appears the variance of the GRP parameter.

As the parameter indirectly describing the results of regional policy, it is possible to consider the size of per capita investments, as they include investments from the federal and regional budgets, the funds for regional support, and also private investments, the volume of which in the region is connected to the developed climate for investment. The estimation of the given parameter is positive, although its elasticity is also insignificant.

3.3. Differentiation of the rates of recession in production

The factors influencing the size of the deviation of the regional indicators of per capita GRP production from the average Russian level have been estimated above. Another, perhaps even more interesting task, is the estimation of the factors determining the dynamics of the reduction of the average per capita GRP indicators of in the Russian regions over the reform period. As we have already mentioned, traditional instruments for such estimations are the neo-classical growth models.

In making empirical estimations, the Solow-Swan model has been taken as a basis [Barro, Sala-i-Martin, 1995]. In the estimation of the parameters of equation (3), it was supposed that the rates of the curtailment of production in the regions were defined by two types of variable: the variables of the initial condition, such as the stock of physical and of human capital; and second, the control or environmental variables. As initial variables, in our case there act the initial levels: GRP; human capital; and a variable reflecting the interaction between physical and human capital. As control variables, the indices of the share of investments and the share of exports in regional GRP have been used.

The initial level of average per capita GRP corresponds to the obtained estimation of real average per capita GRP volumes in 1990. For the characteristic of the stock of human capital in the regions as an initial condition, the indicators of the number of students in secondary schools and higher education institutions per 10,000 people were used in logarithmic form, in addition to the average life expectancy at birth in the regions in 1990. The variable of interaction between GRP and the stock of human capital was determined as follows. The initial value of the GRP logarithms, expressed through the deviations from the sample mean, was multiplied by the sum of the variables reflecting the influence of human capital (the variables were determined as deviations from the sample mean).

Estimates of the parameters of the regression model have been made for 76 regions. The results of these are given in Table 5. The equation as a whole is statistically significant, although the number of statistically significant parameters includes only one – the share of exports in GRP. The estimates of all the examined regressors and the levels of their statistical significance are shown below.

From the Solow-Swan model it follows that, at the given values of the control variables, an increase in the initial level variables (y_{t-1} and h_{t-1}) should reduce Dy_t, due to the decreasing effect of the factors. Therefore, regions with higher levels of the initial conditions grow at slower rates. For the case of negative rates of development, this hypothesis means that the recession in production appeared smaller in those regions primarily where the average per capita level

of GRP was higher and, vice versa, the curtailment of production was largest in the regions with a low initial potential.

Table 5. Factors in the regression of the rates of GRP in 1990-1996 (with the parameters of the growth model)

	b	se	t	p
Constant	-0.682	0.838	-0.813	0.419
Initial log GRP	0.008	0.011	0.762	0.449
log of number of students	-0.013	0.014	-0.983	0.329
log of life expectancy at birth	0.128	0.194	0.665	0.508
Interaction of GRP and human capital	0.041	0.031	1.302	0.197
Ratio of investment to GRP	-0.017	0.076	-0.220	0.826
Ratio of exports to GRP	0.132	0.047	2.834	0.006
F	2.720			
R^2	0.191			

As the rates of GRP are negative, the positive marks of the estimations for the factors relating to the initial conditions confirm the hypotheses discussed above concerning the observed process of divergence: the recession in production appeared smaller in regions with higher levels of the initial conditions, while the curtailment of production was greater in regions with lower levels of the initial conditions. The factors in the regression equation both for the initial level of GRP and life expectancy at birth have positive marks, which confirms the hypotheses of the model.

It follows from the theory of the diffusion of technical progress that a larger size of the stock of human capital promotes a faster absorption of innovations. This effect means that an increase in the level of the stock of human capital increases the response of the rate of growth to a reduction in the initial level of average per capita GRP. It means that the rate of convergence – the reaction Dy_t to $\log(y_{t-1})$ – is greater for a higher level of h_{t-1}. To catch this effect empirically, in the regression equation not only the variables $\log(y_{t-1})$ and h_{t-1} are inserted, but also their interaction in the form $\log(y_{t-1}) \bullet h_{t-1}$. The resulting estimation of the factor of interaction shows that the recession in production appears smaller in regions with a higher level of the examined regressor.

The control variables determine a steady level of production for each "efficient" worker in this model. For example, a higher share of investment in GRP raises the steady level of production for given values of the variable for the initial condition. We used as control variables the share of investments and of exports in GRP. The last regressor in the estimated equation has appeared the only statistically significant parameter with a rather high elasticity, equal to 0.342, which means that an increase in the share of exports in GRP by 1% results in a reduction of the rate of recession in production by 0.34%. This

result quite corresponds to the Russian realities, when the export orientation of development has become one of the determinants of the relative success of the reforms in the regions.

The second of the control variables – the share of investments in GRP – receives a negative mark, although the elasticity of this factor is insignificant. According to the conditions of the examined model, a higher share of investments in GRP raises the steady level of production for each "efficient" worker. If such logic is followed, then the mark for the variable I/Y must be positive; however, in our case, it is negative. This fact can be explained by the conditions formed in the investment sphere. Over the period of the reforms, the investment process has practically stopped; the volume of investments in the Russian economy by 1996 had attained only one-quarter of the volume of investments in 1990. The distribution of investments in the regions is extremely uneven, and if we take into account that the considered time interval is short, then the connection between the share of investments and the rates of growth of GRP in the regions is rather more casual than predictable.

Thus, our attempt to use for an analysis of the dynamics of the Russian regions a standard instrument – the growth model – can hardly be called successful. The received results show that a differentiation in the rates of production can be explained on the basis of the distinctions between the initial levels of the stock of physical and human capital and the control variables, but the estimations are statistically unstable and unreliable. This result was not unexpected, as models of growth do not consider those factors which are seen as basic explanations for the recession in production in the Russian economy, and which characterise the transformation.

In the papers devoted to the study of the transformation recession in transition economies [Полтерович, 1996; Матвиенко, Вострокнутова, Буев, 1998; Попов, 1998; Ellman, 1994; Kornai, 1994; Aslund, 1994], the factors causing the recession in production can be divided into two groups: factors describing the peculiarities of the economic system, formed in a planned economy; and factors connected with the economic policy pursued during reforms. If one takes into account the disproportions in the structure of the economy and in foreign trade before the reform, then the factors connected with the pursued macroeconomic policy and the objective conditions formed in the pre-reform period can explain about 90% of the variations in the dynamics of GRP in transition economies [Попов, 1998].

It is obvious that the same factors affected the differentiation in the size of the recession in production in the Russian regions. But, since all the regions are within the framework of the national economy, then the pursued macroeconomic policy was basically one and the same for the whole country, though it differed in the regions in the rates of liberalisation of the economy,

the level of inflation, and the efficiency of the market institutions. In this connection, the hypothesis that the differentiation of the rates of recession in production in the regions was largely caused by the peculiarities of the economies in the different regions would seem to be a reasonable one.

For a quantitative estimation of the influence of the peculiarities of the economic systems of different regions, and also of the results of the economic policy pursued in the regions and related to them, we estimated regression correlations between the rates of the regional recession in production and the set of factors describing the initial conditions of regional development and the parameters of economic policy.

The dynamics of production were set by the logarithm of the relationship of GRP in 1996 to that of 1990. The regressors for the characteristic of initial conditions were: the volume of average per capita production in 1990; and the share of key sectors of the regional economy in GRP. In the estimation of the influence of the economic policy conducted during the reforms on the recession in production, these factors were used: the export orientation of the region's development; the share of investments in GRP; and the rates of inflation.

The initial hypotheses consisted of the following. We assumed the presence of a process of divergence, which should be reflected in a positive correlation between the rates of GRP reduction and average per capita GRP production in 1990 (i.e. the larger the volume of GRP in 1990, the bigger the value of the index GRP 1996/GRP 1990 – and the less the curtailment of production in 1996 compared to 1990). The structural variables are used to reflect quantitatively the influence of the structure of production which existed in the regions in 1990 on the size of the recession in production. Regarding the variables reflecting the results of economic policy, it was supposed that the export orientation of a region's development promoted a stabilisation of its socio-economic situation. Likewise concerning the share of investments in GRP: a higher level of investments stimulated regional demand and also promoted the stabilisation of the regional economic situation. The rates of inflation can be viewed as a result of the reforms carried out in the region. We assumed that higher rates of inflation in a region led to a greater curtailment of production.

Table 6 shows the estimations of the regression equation of the rates of GRP on the specified factors. The number of statistically significant regressors did not include the shares of trade and transport in GRP, as well as the share of investments in GRP and the industrial price index. The marks of all the factors are "correct", i.e. they correspond to the suggested hypotheses, except for the share of investments in GRP, the factor of which has appeared negative, which is difficult to interpret substantively. As in the case of the growth model, it can be explained by the instability of the volumes of investments made in the region in that period, and their poor correlation with the rates of GRP.

Table 6. Regression of the rates of GRP on the parameters of the initial conditions and economic policy.

	b	se	t	p
Constant	-0.248	0.121	-2.042	0.045
GRP of 1990	0.047	0.011	4.025	0.000
Share of industry in GRP	0.096	0.035	2.77	0.007
Share of agriculture in GRP	0.030	0.013	2.229	0.029
Share of construction in GRP	0.088	0.034	2.572	0.012
Share of trade in GRP	0.071	0.059	1.211	0.230
Share of transport in GRP	0.007	0.016	0.413	0.681
Share of service sector in GRP	0.044	0.021	2.068	0.043
Ratio of exports to GRP	0.093	0.040	2.359	0.021
Ratio of investment to GRP	-0.117	0.071	-1.663	0.101
Consumer price index	-0.139	0.038	-3.635	0.001
Industrial price index	-0.024	0.020	-1.175	0.244
F	7.493			
R^2	0.563			

Four regressors are distinguished by the highest elasticity: the share of industry in GRP; the share of construction in GRP; the factor of export orientation; and the index of consumer prices. This result also corresponds to the suggested hypotheses that those regions which turned out to be the most stable (with the lowest level of recession in production), were the ones which had an export orientation and which had developed actively before the reform period (having a high share of construction in GRP). The factor of elasticity for 1990 GRP appeared to be unexpectedly low, at 0.047. This means that, if the size of the initial level of GRP rises by 1%, the recession in production for the examined period is 0.047% smaller.

On the whole, the advantage of these calculations consists of the fact that they allowed us to assess quantitatively the influence of the examined factors on the size of the recession in production in the regions for the period of 1990-1996.

The task of assessing the influence of the production scales and production structure on the rates of the curtailment of production can be set somewhat differently – as an assessment of the influence of average per capita GRP, the structure of GRP production and the parameters of regional policy carried out in separate years during the period, on the annual rates of recession in production. In this case, it is possible to use for the assessment the available file of panel data,[1] that is, to take into account cross-sectional data.

[1] It was not possible for us to construct a statistically valid regression equation on the basis of panel data for an estimate of the influence of average per capita level of GRP production in 1990 on the size of the recession in production in the regions during 1990-1996, since the regression equation with fixed effects,

The regression of the average annual rates of recession in production in the regions was estimated on the basis of two information files: for 1990-1996, with a smaller set of variables, used above for an estimation of model GRP1; and for 1992-1995, with more fully presented variables of regional policy (with data used in the estimation of model GRP2). Proceeding from the statistical criterion of the estimation of the quality of the regression equation, a model with random effects was chosen. The results of the estimation of the regression for average annual rates of GRP growth in 1990-1996 are given in Table 7.

Table 7. Regression of average annual rates of GRP reduction

	1990-1996		
	b	se	z
Constant	-9.055	0.178	-50.791
GRP	0.880	0.021	42.431
Share of industry in GRP	-0.050	0.017	-2.862
Consumer price index	0.008	0.004	1.985
Share of the service sector in GRP	-0.138	0.019	-7.421
dum Severo-Zapadnyi	0.262	0.057	4.614
dum Tsentralnyi	0.168	0.038	4.463
dum Volgo-Vyatskii	0.265	0.058	4.539
dum Tsentralno-Chernozemnyi	0.201	0.050	4.059
dum Povolzhskii	0.209	0.044	4.742
dum Severo-Kavkazskii	0.306	0.045	6.771
dum Ural	-0.143	0.055	-2.592
dum Dalnii Vostok	-0.473	0.046	-10.269
R^2 (overall)	0.713		
R^2 (within)	0.969		
R^2 (between)	0.184		

From the results of the estimation of the regression equation, it follows that the average annual rates of the curtailment of production in the regions occurred mainly under the influence of four factors: average per capita level of production of GRP in the region (the scale of production); the share of industry in GRP; the share of the service sector in GRP; and the index of consumer prices.

As such, average per capita GRP has a positive mark, i.e. the annual rates of curtailment of production were lowest in the regions with a high average per capita GRP. For the share of industry and the services sector, the correlation is the reverse: the higher the share of these industries in GRP, the higher the annual rates of recession in production.

constructed according to statistical criteria, did not include the GRP regressor of 1990 which had been a constant value for all the periods.

As regressors, reflecting the influence of the regional policy in the given equation, the share of exports in GRP, and the indices of consumer and producer prices were considered. The factor of regression of the index of consumer prices appeared statistically significant. The positive mark of the factor contradicts the results recorded above (Table 6), that the recession in production was smaller in regions with low inflation. However, this fact can be interpreted differently. When formulating the hypotheses concerning the influence of prices, we assumed that, for an average time period, higher prices in a region can be considered as the factor providing an opportunity for obtaining inflationary incomes. The annual rates of reduction in production have been used as a resulting parameter, and so the recorded estimations can reflect the fact that, in the initial years of the reform, when inflation was at its highest, the rates of the rise in prices were higher in the most successful regions. However, the absolute value of the regression factor is very small, so it is possible that such an effect is casual. The indices of producer prices were not included in the number of statistically significant factors, while the indices of regression for the given factors are not large (the estimations of regression for a complete set of the factors are given in the Appendix, Table A2).

The peculiarity of the considered regression is the fact that the number of statistically significant parameters of the equation with rather high elasticity factors includes dummy variables characterising unidentified regional peculiarities. These variables have positive marks for the European regions of the country and negative ones for the Urals and the far-east. As we assumed above, within the number of such peculiarities, not taken into account in a fixed set of regional variables, are likely to belong peculiarities connected with the geographical position of the regions. At least for the regions of the European part of the country, with lower transport expenses, a higher density of economic activities and lower production expenses, the regression factors are positive, but for the Urals and the far-east they are negative.

When estimating the model for 1993-1995, with a more complete data set reflecting regional policy, it appeared that the variables of regional policy were not included in the number of those that were statistically significant (at the 95% confidence level). We'd like to point out again that, as regressors connected with regional policy, we considered average per capita expenses of the regional budget and investments in the regional economy made from the federal budget, the local budget and the federal fund for regional support. Besides the fact that these variables are statistically insignificant, the regression factors with them are small (Table A3 in the Appendix), which can be regarded as the absence of an influence of the indicated regressors on the size of the average annual rates of recession in production in the regions.

Thus, it follows from the results of the estimation of the annual rates of recession in production in a region that the main factors determining the size of the curtailment of GRP production are the scale of production in the region, the GRP structure and unidentified features of the region not connected with the factors of regional policy which we examined.

4. INTER-REGIONAL DIFFERENTIATION OF INCOMES

4.1. Dynamics of personal incomes

In 1970-1980, there was an inter-regional alignment of average per capita money personal incomes in the Russian regions. The differentiation of the parameters of monetary incomes during 1970-1990 tended towards a reduction, the variance in money incomes decreasing from 0.283 in 1970 to 0.207 in 1990. We have no information as to the dynamics in separate years of this period; however, for the period on the whole, there was a rapprochement.

With the beginning of the reform, the differentiation in money incomes continued to decrease until 1994, reaching 0.2 in that year. For 1995-1996, an increase in the inter-regional differentiation is characteristic, and, probably, caused by an increase in the gap between the levels of money incomes in the regions which, from the point of view of their economic situation, were the most safe and those where the economic situation was most grave.

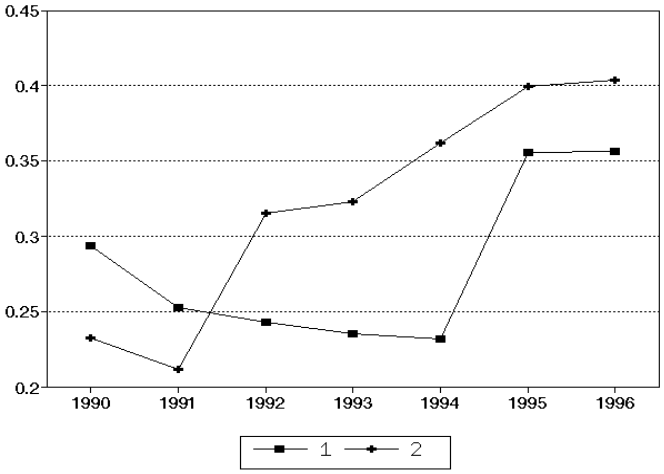
Common statements that the amplification of the inter-regional differentiation of the recent years is caused by Moscow's separation from the average Russian level do not prove to be true. The removal from the sample of the richest regions – the Moscow and the Tyumen areas – results in the fact that the size of the variance decreases a little (in 1996 – from 0.377 for the complete sample to 0.353 without the two specified regions); however, the general picture does not vary.

Even more obvious is the amplification of the differentiation of average per capita money incomes in the consideration of the ratio between the maximum and the minimum levels of income received in different regions. The dynamics of this parameter from 1970 to 1992 corresponded to the dynamics of the variance factor. In 1970, per capita income in the region with the largest incomes (the Magadan area) exceeded the one with the lowest incomes (Republic of Dagestan) by 5.06 times; in 1990, the size of this difference was reduced to 3.54 times. In 1992, there was a sharp leap in the parameter to 5.97 in comparison to 1990 although, in comparison with 1970, the gain was small. Furthermore, the gap between maximum and minimum incomes then increased with each subsequent year: it was 6.63 in 1993, 7.55 in 1994 and 9.03 in 1995.

The presented data on the differentiation of personal money incomes characterise the inter-regional ratio of nominal incomes but, due to the inter-regional distinctions in prices, do not reflect the dynamics of the real incomes of the population, that is the more objective characteristic of the real incomes of the population in the regions.

Along with the beginning of economic reform, the differentiation of real incomes has greatly amplified. The uneven growth in the variance factor fell in 1992, but remained at a high enough level, and more quickly increased in 1994-1995. As with the case of money incomes, the exception from the sample of regions with a high level of income – Moscow – reduces the size of the variance factor of real incomes (for 1996, from 0.412 for the complete sample to 0.373 not including Moscow), although the character of the dynamics does not vary (Figure 2, the variance factors are calculated for 72 regions – the subjects of the RF).

Figure 2. Variance of the parameters of average per capita personal incomes: 1 - money incomes, 2 - real incomes.



According to our estimations, average per capita personal real incomes in Russia have, on the whole, decreased: by 1996, to 62.8% of the 1990 level, with an average annual reduction of 7.5%. Real incomes in 1996 exceeded the level of 1990 only in one region – the city of Moscow; in all other regions the 1990 level of income had not been surpassed. Second in the rank after Moscow is the Tyumen area, in which real incomes in 1996 reached 98.7% of the level of 1990; the largest reduction appeared in the Republic of Kalmykia (17.4% of the 1990 level) and the Sakhalin area (21.5% of 1990). The range of fluctuations in real incomes increased from 3.5 times in 1990 (the Magadan area and Dagestan) to 9.1 times in 1996 (Moscow and Kalmykia).

The standard deviation of the logarithms of average per capita incomes was 0.202 in 1990 and 0.520 in 1996. With an increase of more than twice, the character of the distribution has also changed. For 1990, the situation was

typical; average per capita incomes for the basic part of regions differed insignificantly and more than 60% of the general number of the regions formed one and the same income group. In 1996, with the expansion of the range of values and the increase in the gap between the maximum and the minimum values, there was a shift in the distribution towards the groups with minimum incomes. The structure of the 3 groups with the lowest incomes (out of the 5 examined income groups) included more than 80% of the general number of regions. The number of groups with the highest incomes has decreased.

In an analysis of the dynamics of the inter-regional differentiation of the incomes of the population, we estimated the factor values of σ and β convergence for three time periods: 1970-1980, 1980-1990, and 1990-1996. The statistical data on real personal incomes are available only for 1990-1996. For 1970-1990, only money personal incomes are presented in the statistics. The results of the estimation of the parameters of equation (2) for the 72 regions are given in Table 8.

Table 8. Factor convergence (divergence) of personal incomes

	1970-1980 Money Income	1980-1990 Money Income	1970-1990 Money Income	1990-1996 Real Income
b (se)	0.020 (0.003)	0.013 (0.003)	0.015 (0.002)	-0.035 (0.031)
(t statistic)	7.525	4.558	8.784	-1.123
R^2	0.447	0.229	0.524	0.018

The received estimates of the parameter of the convergence of per capita money incomes for 1970-1990 are statistically significant. The size of factor β was positive for the period 1970-1990, when there was an inter-regional rapprochement of personal incomes. The hypothesis concerning the dependence of the average annual rate of reduction in average per capita incomes from their initial 1990-1996 level has not been statistically confirmed (at the 95% level). The estimate of factor β is negative, corresponding to the process of divergence.

For real personal incomes, as for the per capita GRP parameters, a positive correlation is revealed between the initial level of income in the region and the rate of its reduction during the reform, i.e. the higher the initial level of income in the regions, the smaller is its reduction, which confirms the divergence of the inter-regional parameters.

We have carried out a grouping of regions according to the ratio of average per capita incomes to the average Russian level; this is similar to the grouping presented above for average per capita GRP volumes: 1.1 – regions from the first group, in which per capita incomes in 1990 and in 1996 exceeded the

average Russian level; 1.2 – regions from the first group, which during the reform period have lost a leading position, average per capita incomes in them to the end of the period appearing below the average Russian level; 2.1 – regions from the second group, in which, during the reform, average per capita incomes exceeded the average Russian level; 2.2 – regions from the second group, incomes in which were below the average Russian level in 1990 and in 1996 (Table 9).

In 1990, out of the 72 considered regions, real average per capita personal incomes exceeded the average Russian level in 22 regions, while in 50 they were below average. The group of high-income regions was formed by metropolitan regions, northern ones and regions the production characteristics of which had a particular economic significance, such as the Kemerovo and Tomsk areas, and a number of others.

Table 9. Structure of the groups of regions according to the dynamics of average per capita incomes of the population

Group 1.1	Group 1.2	Group 2.1	Group 2.2.
Komi, Murmansk, St. Petersburg, Moscow, Tyumen, Sakha, Kamchatka, Magadan	Kareliya, Arkhangelsk, Oryol, Kalmykia, Kemerovo, Novosibirsk, Tomsk, Krasnoyarsk, Irkutsk, Primorye, Khabarovsk, Amur, Sakhalin, Kaliningrad	Vologda, Leningrad, Novgorod, Pskov, Tver	Bryansk, Vladimir, Ivanovo, Kaluga, Kostroma, Moscow province, Ryazan, Smolensk, Tula, Yaroslavl, Marii El, Mordoviya, Chuvashiya, Kirov, Nizhniy Novgorod, Belgorod. Voronezh, Kursk, Lipetsk, Tambov, Tatarstan, Astrakhan, Volgograd, Penza, Samara, Saratov, Ulyanovsk, Dagestan, Kabardinskaya, Osetiya, Krasnodar, Stavropol, Rostov, Udmurtiya, Kurgan, Orenburg, Perm, Sverdlovsk, Chelyabinsk, Altay, Omsk, Buryatiya, Tyva, Chita

During the reform, this division has changed: 14 regions from the first group have moved into the second. Among them have appeared mainly northern and far-eastern subjects of the Federation, the high pre-reform level of incomes in which was caused by the presence of extra bonuses and co-efficients in the northern region.

Five regions have moved from the second group into the first; these are regions in the north-west of the country, which differ by the following features: rather low price indices; an export orientation of development; and a recession in production smaller than in other regions. The group of regions with incomes below the average Russian level has extended and now encompasses a number of regions dropping out of the first group.

In accounting for the divergence factors in incomes, statistically significant estimates of regression equation (2), at a 95% confidence interval, were recorded only for group 2.2. The estimation of factor β in the groups of regions for 1990-1996 is shown in Table 10.

For the regions in which 1990 incomes were above the average (groups 1.1 and 1.2), factor β>0, corresponding to the process of rapprochement in average per capita incomes in the groups. In the regions with incomes which were below average at the beginning of the period, the situation is the opposite: within these groups a further stratification has occurred.

Table 10. An estimation of factor β for average per capita incomes in groups of regions

	Group 1.1	Group 1.2	Group 2.1	Group 2.2	Group 1.1 + 2.1	Group 1.2 + 2.2
b (se)	0.193 (0.129)	0.177 (0.183)	-0.113 (0.188)	-0.120 (0.057)	0.096 (0.049)	0.052 (0.043)
t statistic	1.501	0.965	-0.599	-2.112	1.157	1.199
R^2	0.273	0.072	0.107	0.094	0.256	0.025
F statistic	2.252	0.931	0.359	4.461	3.794	1.438
Number of regions	8	14	5	45	13	59

It is characteristic that, if considering the groups of regions according to their condition in 1996, within groups 1.1 + 2.1 («rich» and «becoming rich») and groups 2.2 + 1.2 («poor» and «becoming poor»), a convergence of incomes is observed. However, statistically these statements are true only for the most numerous group of regions with the lowest incomes, for which a reduction in the inter-regional distinctions is observed.

4.2. Factors in income differentiation

The quantitative estimation of the factors determining the inter-regional differentiation of the parameters of real personal incomes was also carried out on the basis of cross-sectional and panel data. Regression equations in both cases were estimated for the 72 regions using models RI1 and RI2. By the use of panel data for both models, according to the formal criteria of an acceptable estimate, have appeared regression models with fixed effects. The results of the estimations of the inter-regional variance in the per capita real incomes of the population for the period 1990-1996 are shown in Table 11.

The following regressors, using cross-sectional data, appear to be statistically significant in model RI1: the initial level of development of the region (log of real incomes in 1990); the share of industry and of agriculture in GRP; and,

among the variables connected to the results of the reforms, the average per capita volume of investments and the average per capita volume of exports.

In addition, among the explanatory variables have appeared regressors embodying a non-identified regional specificity (the regional dummy), for 3 regions: Severo-Zapadnyi; Povolzhskii raion; and Dalnevostochnyi raion.

Table 11. Factors in the regression equation for differentiation of per capita real income (model RI1, 1990-1996)

	Cross-sectional Data			Panel Data		
	b	se	t	b	se	z
Constant	-7.158	0.555	-12.906	-0.585	0.141	-4.143
Initial log RI	0.870	0.075	11.615			
Industry	0.145	0.035	4.171			
Agriculture	-0.159	0.022	-7.099	-0.416	0.048	-8.59
Export	-0.041	0.009	-4.427	-0.052	0.011	-4.774
Service				0.841	0.080	10.542
Investments	0.112	0.011	10.065	0.131	0.012	11.161
Consumer price index				0.202	0.017	11.738
dum Severo-Zapadnyi	0.326	0.046	7.004			
dum Povolzhskii	-0.060	0.030	-2.026			
dum Dalnevostochnyi	-0.191	0.043	-4.421			
R^2 (overall)	0.617			0.241		
R^2 (within)				0.544		
R^2 (between)				0.167		

For the second and third raions, the regional factor was accorded a negative estimation which testifies to its stabilising influence on the size of the regional deviations. The factor of the specific peculiarity of the Severo-Zapadnyi raion has acquired a rather high elasticity (0.326), which explains the deviations from the Russian average of the per capita parameters in regions located in the north-west. It is possible to refer to such peculiarities as the geographical proximity of such regions to European countries and also, in comparison with the other Russian regions, their more successful reforms.

As well as in the case of the differentiation of the parameters of gross regional product, the results of the estimations of per capita incomes have confirmed the hypothesis of the rather essential influence of the initial conditions on the dynamics of the regional deviations. The variable of real incomes in 1990 has a positive mark and the highest elasticity (0.870).

In the transition to panel data, five major factors were included in the number of statistically significant estimates of the regression equation: the share of agriculture; the share of the service sector; per capita exports; per capita investments; and consumer price indices. Thus, negative marks were received only by the share of agriculture in GRP and per capita exports, i.e. these factors exert a stabilising influence on the resulting parameters, their increase resulting in a reduction in inter-regional differentiation.

As well as in the case of the differentiation of GRP, the highest elasticity is found in the service sector. However, the mark of this factor is positive, i.e. the higher the degree of development of this sector, the greater the differentiation in incomes. This fact is co-ordinated with the initial hypotheses concerning the uneven increase in the share of the service sector in the different regions, contributing towards a growth in the differentiation of the population.

According to our hypotheses, a direct influence of regional policy on the dynamics of the real incomes of the population is displayed through the factors connected to the size of the per capita charges to the regional budgets.

The estimation of the parameters of model RI2 is presented in Table 12.

Table 12. Factors in the regression equation of the differentiation in per capita personal real incomes (model RI, 1992-1995)

	Cross-sectional Data			Panel Data		
	b	se	t	b	se	z
Constant	-3.497	0.835	-4.187	0.841	0.297	2.828
Initial log RI	0.714	0.096	7.430			
agriculture	-0.139	0.027	-5.244	-0.173	0.069	-2.503
Budget expenditures	0.347	0.034	10.118	0.142	0.032	4.434
Service				0.667	0.116	5.750
Consumer price index	0.146	0.018	7.926	0.231	0.025	9.003
dum Severo-Zapadnyi	0.313	0.057	5.477			
dum Povolzhskii	-0.075	0.035	-2.130			
dum Dalnevostochnyi	-0.277	0.051	-5.493			
R^2 (overall)	0.699			0.154		
R^2 (within)				0.328		
R^2 (between)				0.137		

With the reduction in the time interval and the addition of a new factor from the number of those which are statistically significant, the factors of export orientation and investments have dropped out and, into the number of

significant factors enter the regional budget expenditures and the indices of consumer prices. With the analysis of the panel data, the structure of significant factors has changed because, instead of two factors – export orientation and per capita investments – the factor of budget expenditures becomes significant with a positive mark and an elasticity of 0.142.

In accounting for the panel data and the factor of budget expenditures, the stabilising influence on the size of the inter-regional differentiation of personal incomes is exerted only by the share of agriculture; all other factors have positive marks – the greatest elasticity in all cases is possessed by the factor determining the share of the service sector in GRP.

The analysis of the panel data has shown that the general size of the standard deviation, as well as in the case of the gross regional product, is determined mainly by inter-group distinctions, i.e. an increased spatial dispersion of the parameters; the temporal (intra-group) deviations are less essential.

CONCLUSION

The analysis of the processes of the inter-regional differentiation in the Russian regions for 1990-1996 has shown that, during the economic reforms, there was an amplification of inter-regional distinctions both in personal income and in the volume of per capita GRP. The processes of the deepening of the inter-regional distinctions are more intensive in the sphere of income formation than in production. The parameter of the variance of per capita incomes increased in 1996 in comparison with 1990 by more than 1.8 times. The variance of per capita GRP in the 6 years increased by 1.12 times, although initially it was essentially larger than the corresponding parameter for incomes (0.499 and 0.207 accordingly).

The estimations of the dependence of the rates of reduction of the regional parameters on the initial conditions already existing in the regions have confirmed the initial hypothesis of the presence of an inter-regional process of divergence. The increase in the parameters of the inter-regional differentiation means that the gap between poor and rich regions is growing. Depending on the change of correlation between the regional and the average Russian parameters, it is possible to single out two groups of regions: rich and becoming rich (where the examined indicators exceed the average Russian level over the whole period, or have exceeded the average level during the reforms); and poor and becoming poor (with indicators lower than the average Russian level during the whole period, or regions that have moved from the group of regions with high indicators to the group of regions with indicators below average).

Concerning the general amplification of the differentiation, the distinctions between the groups have increased although, within the groups, a relative

rapprochement between the parameters is observed. The development of the process of differentiation is caused by an increasing separation of the group of the most successful regions from the mass.

The set of variables of the regression equations, on the basis of which a quantitative estimation of the factors determining the inter-regional differentiation was carried out, included a description of the initial conditions which existed in the regions before the reforms, structural variables, and also the parameters connected to the results of reform in the regions. The analysis of panel data has shown that the general size of the standard deviation for gross regional product and for real income is determined mainly by inter-group distinctions, i.e. an increased spatial dispersion of the parameters, while the temporal (intra-group) deviations are less essential.

The hypothesis concerning the dependence of the recession in the regional parameters on their initial level is confirmed. The reduction in per capita parameters was strongest in the regions which were under-developed before the reform. To the number of factors connected to the changes in the regional structure of production, and exerting the most essential influence on the dynamics of inter-regional deviations, are the share of agriculture in GRP, which renders a stabilising influence on the size of the deviations, and the development of the service sector, the increase in the share of which leads to an amplification of inter-regional distinctions.

The estimation of the factors connected to regional policy (per capita charges to the regional budgets, rates of inflation, per capita investments) has statistically confirmed their influence on regional differentiation. The specified factors have received positive estimations, i.e. with their increase, inter-regional deviations are also increased. However, the elasticity of the factors connected to the results of the reform is insignificant. This fact testifies to the rather limited opportunities for influencing the resulting parameters of the differentiation by means of short-term and medium-term regional policy, to which can be referred the variables included in the analysis which are connected with regional policy. In all probability, the problem of the smoothing of the inter-regional distinctions could be solved in the long-term on the basis of the measures of long-term regional policy, structural and investment-oriented first of all. However, estimating the influence of this in the short interval of time under consideration is impossible.

BIBLIOGRAPHY

Анализ тенденций развития регионов России в 1992-1995 гг. (1996a), Программа Европейского Союза Тасис. Контракт BIS/95/321/057. Москва.

Анализ тенденций развития регионов России. Типология регионов, выводы и предложения (1996b), Программа Европейского Союза Тасис. Контракт BIS/95/321/057. Москва.

Индексы цен и тарифов в Российской Федерации в 1992 году (1994), Госкомстат РФ, Москва.

А. Жандаров, Ф. Шиллер, Е. Никитина (1995): Экономическая безопасность России: региональный уровень. 3, 20-27.

Н. Маркова (1996): Регионы России: итоги четырех лет экономических реформ. . 3, 47-55.

Матвиенко, Е. Вострокнутова, М. Буев (1998): Трансформационный спад и предпосылки роста в России. Научные доклады РПЭИ, 98/03.

Методологические положения по статистике (1996): Вып.1. Логос, Москва.

В.В. Попов (1998): Шокотерапия против градуализма: конец дискуссии (не опубликовано).

Регионы России (1997): Госкомстат РФ, Москва.

Российский статистический ежегодник (1996): Логос, Москва.

А.И. Трейвиш, Т.Г. Нефедова (1994): Экономическое пространство России: проблемы регионального расслоения. Институт географии РАН, Центр изучения российских земель журнала "Ваш выбор", Москва.

И.Новикова, В Рябцев, Е. Тихомирова (1995): Сравнительный анализ индикаторов экономического и социального развития регионов Ассоциации "Большая Волга". 3, 28-36.

Е.Чистяков, Т.Теплухина (1996): Валовой внутренний продукт регионов-субъектов РФ. 4, 6-18.

Alonso, W. (1980): Five bell shapes in development, Papers, 45, 5-16.

Anders Aslund (1994): Lessons of the First Four Years of Systematic Change in Eastern Europe. , 19, 22-38.

Robert J. Barro (1991): Economic Growth in Cross Section of Countries. , 106.

Barro, R.J. and X. Sala-i-Martin (1991): Convergence across States and Regions. 1, 107-58.

Barro, R.J. and X. Sala-i-Martin (1992): Convergence.
, vol. 100, 223-51.

Barro, R.J. and X. Sala-i-Martin (1995): Economic Growth. McGraw-Hill, Inc.

Jian Chen and Belton M. Fleisher (1996): Regional Income Inequality and Economic Growth in China. 22, 141-164.

Michael Ellman (1994): Transformation, Depression, and Economics: Some Lessons. , 19, 1-21.

Janosh Kornai (1994): Transformational Recession: The Main Causes.
, 19, 39-63.

M. Kuboniwa (1996): National Income in Post-War Central Asia. Institute of Economic Research of Hitotsubashi University. Discussion Paper No. D96-6, June, 1996.

Sandwip Kumar Das and Alokesh Barua (1996): Regional Inequalities, Economic Growth and Liberalisation: A Study of the Indian Economy
, Vol. 32, No. 3, 364-390.

Frank C. Lee (1996): Convergence in Canada? ,
XXIX, Special Issue.

Rodwin, L., and H. Sazanami, eds (1988): Deindustrialization and Regional Economic Transformation: The Experience of the United States, UNCRD, New-York.

Rodwin, L., and H. Sazanami (1991): Industrial Change and Regional Economic Transformation: The Experience of Western Europe, Harper Collins, New York.

X.X. Sala-i-Martin (1996a): Regional cohesion: Evidence and theories of regional growth and convergence 40, 1325-1352.

X.X. Sala-i-Martin (1996b): The classical approach to convergence analysis.
106,1019-1036.

Kai-yuen Tsui (1996): Economic reform and interprovincial inequalities in China.
. Vol. 50, 353-368.

Yehua Wei and Laurence J.C. Ma. (1996): Changing patterns of spatial inequality in China, 1952-1990. , 18 (2), 177-191.

Williamson, J.G., (1965): Regional Inequality and Process of National Development: A Description of the Patterns.
. Vol. 13, No. 4, Part II, 3-83.

APPENDIX

A.1. Per capita GRP in regions - subjects of Federation (thousands rub.)

	1990	1991	1992	1993	1994	1995	1996
RF	6775,5	5831,5	4328,3	4005,4	3586,4	3621,0	3533,7
Kareliya	8195,3	7214,7	5160,4	4807,6	4494,9	4442,5	4008,9
Republic of Komi	8294,0	7310,9	6140,5	5707,3	5377,2	4954,3	4804,1
Arkhangelskaya Oblast	7561,9	6531,3	4901,5	4566,2	3999,9	3820,9	3567,9
Vologodskaya Oblast	6784,0	6155,8	5331,7	4997,4	4551,0	4712,1	4614,1
Murmanskaya Oblast	9986,6	8768,2	6969,8	6465,6	5490,7	5361,8	5368,5
St.-Petersburg	8165,1	6316,8	4702,8	4257,9	3323,5	3510,5	3133,3
Leningradskaya Oblast	4745,5	4295,8	3520,7	3291,5	2935,2	2932,4	2675,4
Novgorodskaya Oblast	4049,6	3870,2	2831,9	2764,8	2540,6	2461,2	2398,5
Pskovskaya Oblast	3954,2	3658,2	2874,0	2625,3	2260,7	2111,9	1849,4
Bryanskaya Oblast	5163,8	4492,4	3390,8	2740,3	2266,3	2059,9	1842,2
Vladimirskaya Oblast	4914,4	4463,0	3301,5	3051,1	2450,7	2291,4	2062,2
Ivanovskaya Oblast	5112,0	4621,5	2837,3	2536,5	2056,2	1859,9	1814,3
Kaluzhskaya Oblast	4286,1	3838,0	3002,2	2807,5	2711,5	2656,3	2345,0
Kostromskaya Oblast	5254,7	4836,1	3358,7	3243,3	2690,4	2550,9	2329,3
Moscow	10126,7	8156,8	5900,4	6393,1	6318,0	6646,4	7213,4
Moskovskaya Oblast	5140,7	4632,5	3514,4	3399,3	2792,3	2777,8	2582,2
Orlovskaya Oblast	5977,6	5052,0	3349,5	3043,1	2544,2	2275,0	2306,1
Ryazanskaya Oblast	6095,3	5506,6	3772,9	3417,2	2981,3	2620,8	2410,4
Smolenskaya Oblast	5502,2	4916,2	3407,9	3160,2	2855,5	2672,1	2538,4
Tverskaya Oblast	4846,2	4339,8	3231,4	3161,3	2808,1	2623,5	2434,7
Tulskaya Oblast	5254,0	4800,5	3562,4	3219,7	2785,2	2762,8	2487,2
Jaroslavskaya Oblast	8881,5	7649,5	5097,3	4661,8	4166,6	3919,3	3640,3
Republic Marii El	4205,9	3886,3	2555,6	2494,4	2326,9	1928,1	1766,2

Mordoviya	4245,4	4476,3	3034,0	2781,0	1986,3	1837,7	1753,2
Chuvashiya	4557,3	4176,4	2944,5	2690,7	2223,8	2200,3	2113,2
Kirovskaya Oblast	4943,5	4628,3	3459,8	3222,2	2646,7	3857,0	2583,4
Nizhegorodskaya Oblast	6796,0	6262,4	5053,8	4870,6	3839,1	3506,0	3222,5
Belgorodsksys Oblast	4785,1	4041,7	3087,1	2906,0	2798,9	2912,1	2884,4
Voronezhskaya Oblast	4713,2	4256,5	3276,9	3140,2	2309,1	2276,1	2042,1
Kurskaya Oblast	5557,8	4758,8	3594,5	3264,4	2810,8	2729,5	2634,8
Lipetskaya Oblast	7436,9	6503,2	5046,1	4477,2	3871,0	4017,5	4101,7
Tambovskaya Oblast	4053,4	3589,5	2613,8	2544,6	2166,2	2058,4	1938,9
Kalmykiya	3876,6	3048,3	1869,0	1621,5	1404,7	1308,7	1235,1
Tatarstan	5174,9	4656,4	3993,5	3562,1	3218,2	3249,9	3307,5
Astrakhanskaya Oblast	3749,7	3150,7	2329,8	2232,3	2116,0	1916,5	1708,0
Volgogradskaya Oblast	7474,1	6451,1	4737,9	3672,2	3167,0	2889,6	2592,2
Penzenskaya Oblast	3811,2	3470,4	2890,0	2405,6	2031,8	1877,7	1669,4
Samarskaya Oblast	9097,8	8280,4	6367,3	5993,2	4791,2	4788,6	5011,2
Saratovskaya Oblast	6242,1	5358,9	3916,9	3626,3	2924,6	2587,5	2409,1
Ylyanovskaya Oblast	5000,2	4697,1	3614,2	3433,2	3182,3	2672,0	2628,1
Adyheya	3197,0	2754,2	1906,1	1877,7	1525,4	1439,1	1238,4
Dagestan	3414,6	2229,0	1422,0	1320,7	2050,9	1010,2	945,5
Kabardinskaya	3239,5	2820,6	1610,2	1456,6	1297,2	1151,2	1141,3
Cherkesskaya	4036,1	3173,2	2309,0	1903,8	1706,6	1679,8	1669,9
Osetiya	4756,9	3804,9	2041,6	1650,6	1370,3	1419,2	1483,1
Krasnodarskii Kray	4363,9	3749,3	2580,1	2403,7	2403,7	2287,1	2255,0
Stavropolskii Kray	6079,7	5069,5	3204,8	2969,4	2511,5	2517,7	2528,8
Rostovskaya Oblast	5342,8	4518,5	2947,7	2490,4	2109,2	2050,1	2035,3
Bashkotorstan	5455,9	5109,3	4304,1	3801,3	3375,9	3357,4	3274,9
Udmurtiya	6014,9	5526,2	3977,7	3589,7	3118,0	2911,4	2718,2
Kyrganskaya Oblast	5469,2	4929,4	3600,7	3325,0	2494,5	2218,0	2025,9

Orenburgskaya Oblast	6668,7	6008,0	5004,5	4326,3	3596,0	3314,4	3315,0
Permskaya Oblast	6830,8	6288,3	5015,0	5448,7	4382,2	4237,8	3801,8
Sverdlovskaya Oblast	7979,7	7180,9	5079,3	4546,5	4136,3	4054,9	3769,0
Chelyabinskaya Oblast	7812,1	7003,5	5242,3	4458,3	3842,1	3735,5	3557,1
Republic Altay	3340,8	2792,4	2193,7	2322,3	2070,5	2079,9	2033,8
Altayskii Kray	5385,0	4770,2	3437,7	3044,4	2399,5	2453,4	2199,7
Kemerovskaya Oblast	8099,5	6884,1	5114,2	4864,3	4563,3	4826,4	4170,2
Novosibirskaya Oblast	7197,0	6022,9	3983,0	3770,3	3255,9	3318,5	3108,9
Omskaya Oblast	6206,9	5493,9	4053,3	3542,4	3088,4	3149,2	3099,4
Tomskaya Oblast	7266,4	6438,5	5269,1	4606,2	4114,5	4081,2	3786,2
Tumenskaya Oblast	16468,2	14652,4	12295,4	11763,1	10211,8	10644,2	10303,1
Buryatiya	6511,8	5690,6	4646,6	4036,4	3680,8	3450,1	3245,2
Repuvlic Tyva	5044,7	3840,9	2475,1	1994,6	1850,3	1757,4	1630,6
Khakassiya	7283,0	7070,7	5108,8	4995,1	4379,8	4287,7	4443,5
Krasnoyarskii Kray	10005,0	8621,0	6284,7	5690,3	5007,2	5148,8	5070,7
Irkutskaya Oblast	7861,1	6938,6	5556,1	4988,7	4473,9	4404,0	4182,5
Chitinskaya Oblast	6724,9	5961,5	4563,8	3945,5	3394,6	3183,0	2983,6
Republic Sakha	13715,8	11928,9	8254,3	8053,4	8690,0	8790,3	8970,7
Primorskii Kray	9137,6	7626,6	4358,2	3708,5	3458,1	3033,2	2940,0
Khabarovskii Kray	8000,4	6927,5	4977,8	4934,2	3888,9	3335,9	3296,0
Amurskaya Oblast	9575,4	7732,3	5167,2	4668,4	4269,8	3781,5	4036,1
Kamchatskaya Oblast	16267,7	14474,5	8352,2	8408,6	6461,2	6660,1	6659,4
Magadanskaya Oblast	14953,3	12115,3	6025,9	8282,9	8210,4	8650,6	7476,3
Sakhalinskaya Oblast	13265,5	10714,9	6583,6	5449,5	5073,9	4681,8	4539,0
Kaliningradskaya Oblast	4711,7	4414,4	2989,6	2976,7	2546,2	2043,2	2066,5

A2. Regression in annual rates of reduction in GRP (equation with complete set of variables) for 1990-1996

	b	se	z	p
Constant	-9,314	0,179	-51,812	0,000
GRP	0,963	0,018	53,683	0,000
Industry	-0,050	0,012	-4,391	0,000
Agriculture	0,023	0,013	1,812	0,070
Domestic trade	-0,007	0,007	-0,964	0,335
Transport	-0,009	0,009	-0,985	0,325
Service sector	-0,077	0,016	-4,856	0,000
Share of exports in GRP	-0,002	0,002	-0,946	0,344
Construction	0,002	0,011	0,201	0,084
Consumer price index	0,014	0,006	2,358	0,018
Industrial price index	-0,005	0,004	-1,249	0,212
dum Severo-Zapadnyi	0,424	0,078	5,460	0,000
dum Tsentralnyi	0,226	0,056	4,065	0,000
dum Volgo-Vyatskii	0,369	0,071	5,169	0,000
dum Tsentralno-Chernozemnyi	0,256	0,064	4,012	0,000
dum Povolzhskii	0,273	0,060	4,577	0,000
dum Severo-Kavkazskii	0,414	0,061	6,839	0,000
dum Ural	-0,245	0,059	-4,184	0,000
dum Zapadnaya Sibir'	0,056	0,060	0,922	0,356
dum Vostochnaya Sibir'	-0,031	0,066	-0,467	0,640
dum Dalnii Vostok	-0,467	0,060	-7,784	0,000
R^2 (overall)	0,711			
R^2 (within)	0,995			
R^2 (between)	0,223			

A3. Regression of annual rates of reduction in GRP (equation with complete set of variables) for 1994-1995

	b	se	z	p
Constant	-9,385	0,328	-28,63	0,000
GRP	0,984	0,022	44,335	0,000
Industry	-0,060	0,014	-4,331	0,000
Agriculture	0,021	0,015	1,383	0,167
Domestic trade	-0,002	0,005	-0,499	0,618
Transport	-0,003	0,007	-0,422	0,673
Service sector	-0,073	0,024	-3,099	0,002
Construction	-0,001	0,014	-0,044	0,965
Consumer price index	0,015	0,014	1,119	0,296
Industrial price index	-0,014	0,009	-1,481	0,139
Budget expenditures	0,006	0,009	0,68	0,497
Share of exports in GRP	-0,002	0,003	-0,940	0,347
Investments from federal budget	-0,002	0,004	-0,467	0,641
Investments from local budget	0,007	0,005	1,404	0,160
Investments from the Fund of regional support	0,004	0,002	1,919	0,055
dum Severo-Zapadnyi	0,434	0,126	3,437	0,001
dum Tsentralnyi	0,240	0,090	2,662	0,008
dum Volgo-Vyatskii	0,372	0,116	3,213	0,001
dum Tsentralno-Chernozemnyi	0,275	0,103	2,666	0,008
dum Povolzhskii	0,279	0,097	2,883	0,004
dum Severo-Kavkazskii	0,419	0,099	4,244	0,000
dum Ural	-0,247	0,096	-2,586	0,010
dum Zapadnaya Sibir'	0,049	0,099	0,497	0,619
dum Vostochnaya Sibir'	-0,031	0,107	-0,291	0,771
dum Dalnii Vostok	-0,477	0,098	-4,877	0,000
R^2 (overall)	0,442			
R^2 (within)	0,994			
R^2 (between)	0,411			